MONTANA DIABETES SURVEILLANCE & CLINICAL COMMUNICATION

MONTANA DIABETES PROJECT

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THREE-YEAR PREVALENCE AND INCIDENCE OF DIABETES AMONG AMERICAN INDIAN YOUTH IN MONTANA AND WYOMING, 1999-2001

WHAT'S INSIDE

BACKGROUND:

Until recent years, diabetes in childhood and adolescence was assumed to be classic immune-mediated diabetes. Although type 2 diabetes among youth was first described in 1979 among the Pima Indians, only recently have awareness and concern about this issue grown.[1-4] Currently the rate of type 2 diabetes in Pima youth is four times higher than the rate of type 1 diabetes in children in non-Indian communities.[4]

Clinic-based studies have provided prevalence and incidence estimates of type 2 diabetes in youth among other Indian and non-Indian populations.[3] However, relatively few surveillance efforts provide estimates of the incidence and/or changes in prevalence of type 2 diabetes in youth over time.[3] Conducting public health surveillance for diabetes in youth is challenging in that no standardized case definitions for diabetes by type currently exist. The American Diabetes Association consensus statement on type 2 diabetes in children proposed a research classification based on risk factors and laboratory testing for immune markers and residual insulin secretory capacity.[5] However, utilizing these tests for surveillance is not practical because they are neither widely available nor standardized.

In 1999, the Billings Area Indian Health Service (IHS) and the Montana Department of Public Health and Human Services (Montana DPHHS) established surveillance for diabetes in American Indian youth in Montana and Wyoming. Case definitions for probable type 1 and type 2 diabetes were developed based on the existing knowledge of risk factors and laboratory markers available from the medical record.[6] This report describes the three-year prevalence and incidence estimates of diabetes in American Indian youth by probable type from 1999 through 2001.

METHODS:

All American Indian youth aged <20 years with one or more outpatient visits or hospitalizations coded for diabetes (ICD-9 CM codes 250.0 – 250.9) as a reason for an outpatient visit or a diagnosis on hospitalization from 1997 through 2001 were identified from the IHS data base from five reservations in Montana and Wyoming and their medical records were reviewed. Demographic and clinical information was collected and the diagnosis confirmed by documentation of diagnostic blood glucose values and/or treatment with anti-diabetic therapies. Laboratory information (islet cell antibody testing, c-peptide or insulin) was collected through the first year after diagnosis, and fasting c-peptide levels >3.0 mg/ml (normal range 0.5-3.0) and insulin levels >22.0 uU/ml (normal range 0.0-22.0) were considered "elevated." Additionally, information regarding the course of treatment with insulin and other hypoglycemic agents was collected for the entire period of follow-up. Weight per age percentiles were calculated based on the CDC National Center for Health Statistics growth curves.[7] The criteria used to classify cases as probable type 1 and probable type 2 diabetes are displayed in Table 1.

Prevalence estimates per 1,000 youth for 1999, 2000, and 2001 were calculated overall, by probable type of diabetes, by age, and by sex. Incidence estimates per 100,000 youth for the three-year period were calculated overall. The IHS user population of youth aged 19 years or less for 1995 (N = 22,742), 1996 (N= 22,881) and 1997 (N = 23,035) were used as the denominator for these calculations.

Table 1.
Case definitions used for probable type 1 and probable type 2 diabetes in youth*.

Probable Type 2 diabetes	Probable Type 1 diabetes
1. Weight per age at diagnosis was ≥95th percentile for age and sex 2. Acanthosis nigricans was noted 3. If measured, C-peptide or insulin was elevated within one year of diagnosis 4. Family history for type 2 diabetes 5. Oral hypoglycemic agents with or without insulin were used at follow-up more than one year from diagnosis or there was no current pharmacologic treatment one year after diagnosis	1. Age ≤5 years at diagnosis 2. Weight per age at diagnosis was ≤10th percentile for age and sex 3. If measured, positive islet cell antibody test less than a year after diagnosis

*Youth with one or more of the elements for type 1 diabetes listed above were classified as having probable type 1 diabetes. Youth were classified as having probable type 2 diabetes if they had one or more of the elements above.

RESULTS:

Fifty-four, 56, and 56 prevalent cases and 9, 6, and 8 incident cases of diabetes in youth aged less than 20 years were identified over the three-year period, respectively (Table 2). Over half of the prevalent cases were categorized as having probable type 2 diabetes in each year. Less than 16% of prevalent cases could not be categorized and ≤6% had diabetes secondary to other conditions (e.g., steroid therapy for asthma, pancreatitis) over this time period. Of the incident cases, 70% were categorized as having probable type 2 diabetes.

The prevalence and incidence rates among youth were stable over this three-year period and were approximately two times higher for probable type 2 diabetes compared with probable type 1 diabetes (Figures 1 and 2). Over the three-year period, the prevalence rates among boys were slightly higher for probable type 2 compared to probable type 1 diabetes (data not shown). For girls, the prevalence rates were over two times higher for probable type 2 compared to probable type 1 diabetes. For probable type 1 diabetes, the prevalence rates declined with increasing age (data not shown). For probable type 2 diabetes, the prevalence rates were highest among youth aged 10-14 years.

Table 2. Number of prevalent and incident cases of diabetes among American Indian youth, by probable type and year, Montana and Wyoming, 1999-2001.

	Number of cases (%)							
	Prevalent				Incident			
Time Period	Type 1	Type 2	Other⁺	Unknown	Type 1	Type 2	Other+	Unknown
1999	16 (30)	28 (52)	3 (6)	7 (13)	2 (22)	6 (66)	1 (11)	0 (0)
2000	15 (27)	31 (55)	3 (5)	7 (13)	0 (0)	6 (100)	0 (0)	0 (0)
2001	16 (29)	29 (52)	2 (4)	9 (16)	2 (25)	4 (50)	0 (0)	2 (25)

⁺Diabetes secondary to other conditions.

Figure 1. Prevalence of diabetes in American Indian youth, by probable type and year, Montana and Wyoming, 1999-2001.

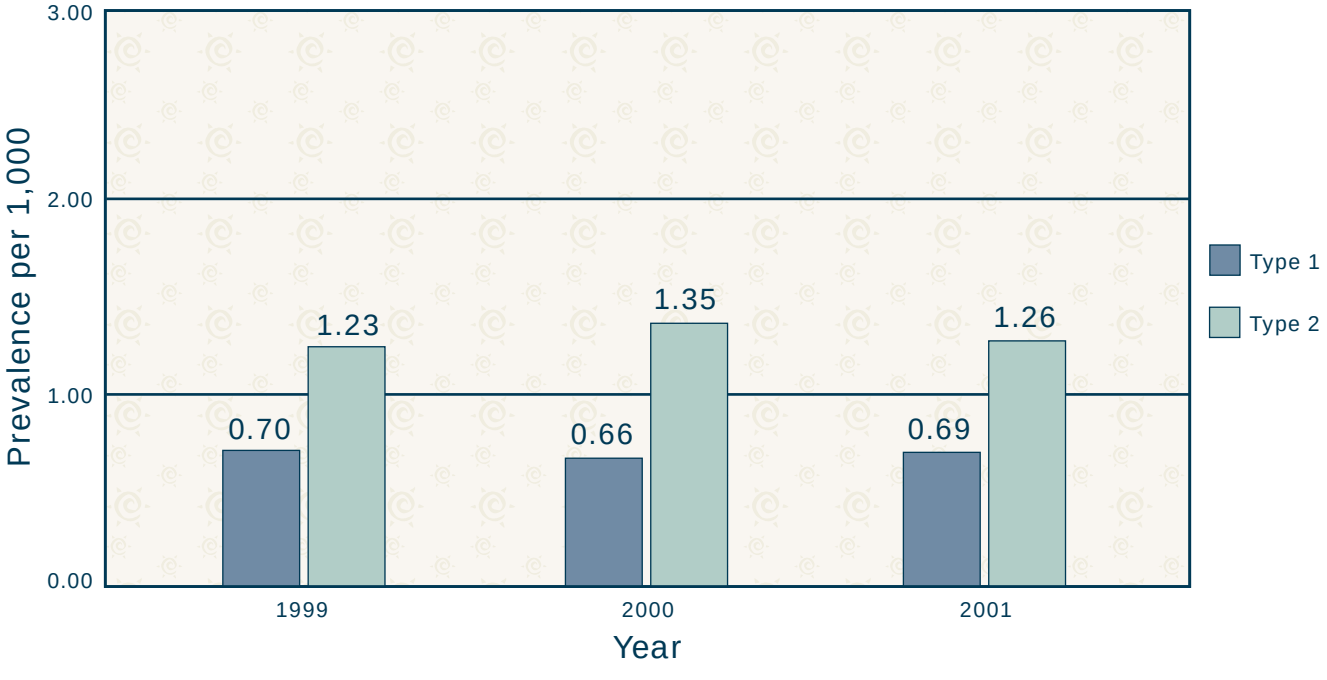
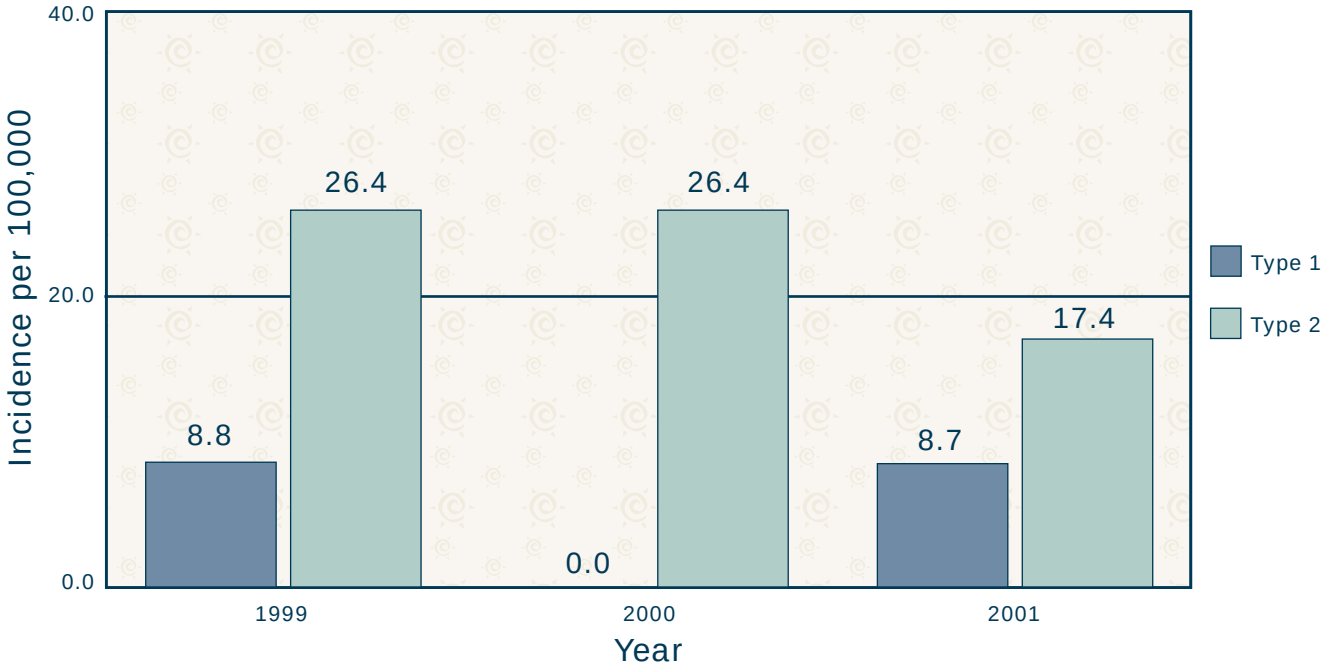


Figure 2 . Incidence of diabetes in American Indian youth, by probable type and year, Montana and Wyoming, 1999-2001.



Of the 23 incident cases identified over the three-year period, over 70% were categorized as having probable type 2 diabetes, 17% as probable type 1, 9% could not be classified, and one case had diabetes secondary to another condition. The mean age at diagnosis for cases categorized as probable type 2 was 13.2 years (SD 4.2) and 50% were female. Of those categorized as having probable type 1 diabetes, the mean age at diagnosis was 6.0 years and 25% were female. Of the cases that could not be classified, the mean age at diagnosis was 12.4 years and all were female.

SUMMARY OF FINDINGS:

1. The prevalence and incidence of probable type 2 diabetes over this three-year period remained stable among American Indian youth aged <20 years in Montana and Wyoming.

2. During the three-year period, 53% of prevalent cases and 70% of incident cases were categorized as having probable type 2 diabetes.

CONCLUSIONS:

Our findings suggest that the prevalence and incidence of probable type 2 diabetes among American Indian youth in Montana and Wyoming were stable over a three-year period. Previous studies demonstrating increases in the prevalence and incidence of type 2 diabetes in youth were conducted over 12-to 20-year time periods.[3] Childhood obesity has increased over recent decades[8], and the epidemic of type 2 diabetes in youth is likely to continue to emerge. As tribal communities develop their diabetes prevention interventions targeting obesity, this surveillance system will help them track their efforts long-term. A recent study by Sinha and colleagues, which is summarized in this issue, emphasizes the risk of impaired glucose tolerance in obese children of all populations.[9]

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8. Strauss RS, Pollack HA. *Epidemic increase in childhood overweight*, 1986-1988. JAMA 2001;286:2845-2848.
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IN THE LITERATURE:

Sinha R, Fisch G, Teague B, et al. ***Prevalence of Impaired Glucose Tolerance among Children and Adolescents with Marked Obesity.*** N Engl J Med 2002;346:802-810.

Background: Childhood obesity, epidemic in the United States, has been accompanied by an increase in the prevalence of type 2 diabetes among children and adolescents. We determined the prevalence of impaired glucose tolerance in a multiethnic cohort of 167 obese children and adolescents.

Methods: All subjects underwent a two-hour oral glucose-tolerance test (1.75 mg of glucose per kilogram of body weight), and glucose, insulin, and C-peptide levels were measured. Fasting levels of proinsulin were obtained, and the ratio of proinsulin to insulin was calculated. Insulin resistance was estimated by homeostatic model assessment, and beta-cell function was estimated by calculating the ratio between the changes in the insulin level and the glucose level during the first 30 minutes after the ingestion of glucose.

Results: Impaired glucose tolerance was detected in 25 percent of the 55 obese children (4 to 10 years of age) and 21 percent of the 112 obese adolescents (11 to 18 years of age); silent type 2 diabetes was identified in 4 percent of the obese adolescents. Insulin and C-peptide levels were markedly elevated after the glucose-tolerance test in subjects with impaired glucose tolerance but not in adolescents with diabetes, who had a reduced ratio of the 30-minute change in the insulin level to the 30-minute change in the glucose level. After the body-mass index had been controlled for, insulin resistance was greater in the affected cohort and was the best predictor of impaired glucose tolerance.

Conclusions: Impaired glucose tolerance is highly prevalent among children and adolescents with severe obesity, irrespective of ethnic group. Impaired oral glucose tolerance was associated with insulin resistance while beta-cell function was still relatively preserved. Overt type 2 diabetes was linked to beta-cell failure.

Harwell TS, Dettori N, McDowall JM, Quesenberry K, Priest L, Butcher MK, Flook BN, Helgerson SD, Gohdes D. ***Do persons with diabetes know their (A1C) number?*** Diabetes Educ 2002;28(1):99-105.

Purpose: The objective of this study was to compare self-reported knowledge about A1C testing with information from the medical record.

Methods: A telephone survey was conducted among patients with diabetes in a rural fee-for-service practice and a community health center. Self-reported information regarding A1C testing, the last A1C value, and perceived blood glucose control was compared with the most current A1C value documented in the medical record.

Results: Seventy five percent of survey respondents reported having 1 or more A1C tests in the past year, which generally agreed with information from their medical records. However, only 24% of those who reported having a test remembered the actual value, and the self-reported values correlated weakly with the last A1C on the medical record. Among those with a documented A1C value, half described their blood glucose as very well controlled. The last A1C value, however, was <7.0% in only half of those respondents.

Conclusions: Persons with diabetes were aware of their previous A1C testing but did not interpret the values accurately in relation to their own glycemic control. If clinicians expect patient knowledge and understanding of glycemic control measures to improve outcomes of care, patient education will need to emphasize the meaning of these values.

Levetan CS, Dawn KR, Robbins DC, Ratner RE. ***Impact of computer-generated personalized goals on HbA(1c).*** Diabetes Care 2002;25(1):2-8.

Objective: The public is increasingly aware of the importance of HbA(1c) testing, yet the vast majority of patients with diabetes do not know their HbA(1c) status or goal. We set forth to evaluate the impact of a system that provides uniquely formatted and personalized reports of diabetes status and goals on changes in HbA(1c) levels.

Research design and methods: A total of 150 patients with diabetes were randomized to receive either standard care or intervention inclusive of a computer-generated 11" x 17" color poster depicting an individual's HbA(1c) status and goals along with personalized steps to aid in goal achievement. All patients enrolled received diabetes education during the 3 months before enrollment. HbA(1c) was performed at baseline and 6 months.

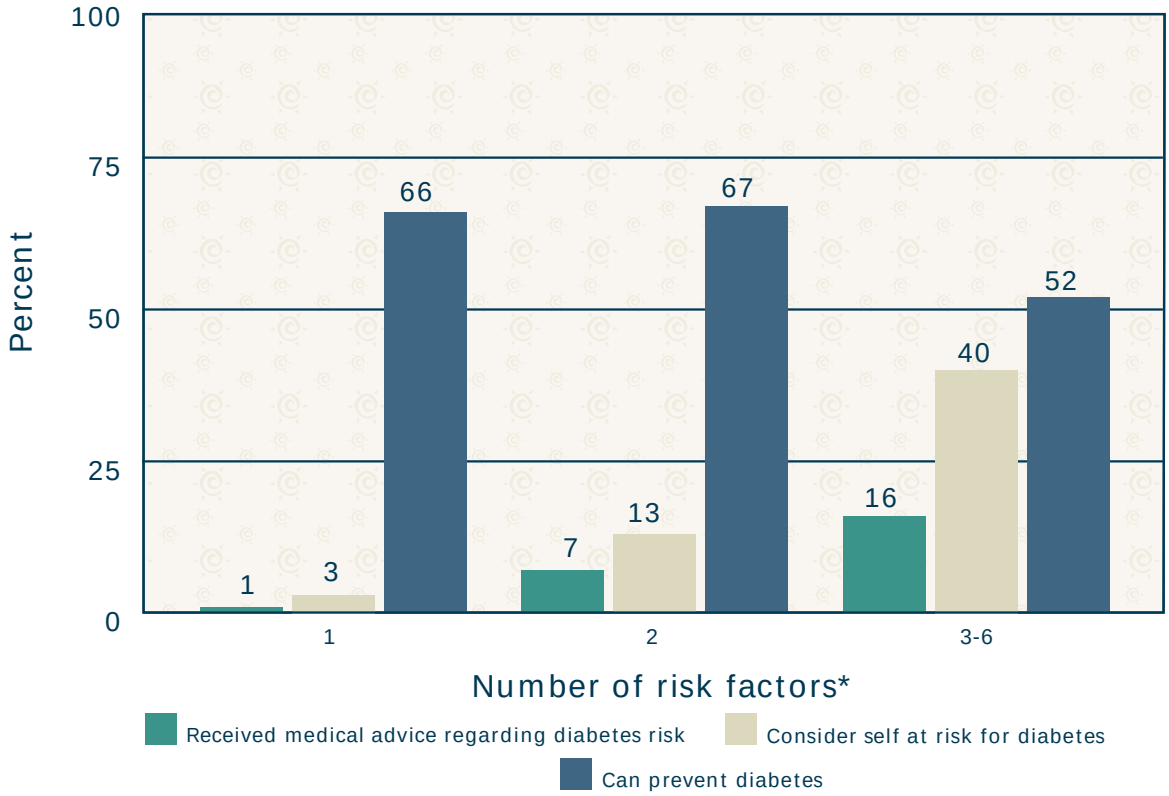
Results: At baseline, there were no significant differences between patient groups in terms of age, sex, education level, race, and HbA(1c) or lipid levels. Among patients with baseline HbA(1c) > or =7.0%, there was an 8.6% (0.77% absolute) reduction in HbA(1c) among control subjects compared with a 17.0% (1.69% absolute) decline in the intervention group (P = 0.032). There were no differences between the control and intervention groups with respect to the frequency of patients experiencing any decline in HbA(1c) (63 vs. 69%, P = 0.87); among these patients experiencing a decline, the most substantial reductions were seen with the control group, which had a 13.3% (1.15% absolute) decline compared with the intervention patients, who reduced their HbA(1c) by 24.2% (2.26% absolute reduction; P = 0.0048). At study close, 77% of the patients had their poster displayed on their refrigerator.

Conclusions: This unique and personalized computer-generated intervention resulted in HbA(1c) lowering comparable to that of hypoglycemic agents.

ERRATA:

In the October-December issue of the Montana Diabetes Surveillance Report, the categories for Figure 2 on page 4 were missing. A corrected figure is displayed below.

Figure 2. Percentage of repondents who had ever received medical advice regarding diabetes risk, considered themselves at risk for diabetes and perceived that they could prevent getting diabetes by number of risk factors for diabetes.



*Risk factors include age >45 years, overweight (BMI >25.0 kg/m^2), told have high blood pressure, told have high cholesterol, family history of diabetes and gestational diabetes.

SAVE THE DATE:

The annual diabetes conference for health professionals is planned for October 18-19, 2002 at the Rock Creek Resort in Red Lodge, Montana.

The Keynote speaker will be Dr. Barbara Howard with the MedStar Research Institute. Save the date for this exciting meeting!

WHAT IS THE MONTANA DIABETES PROJECT AND HOW CAN WE BE CONTACTED:

The Montana Diabetes Project is funded through a cooperative agreement with the Centers for Disease Control and Prevention, Division of Diabetes Translation (U32/CCU815663-04). The mission of the Diabetes Project is to reduce the burden of diabetes and its complications among Montanans. Our web page can be accessed at http://ahec.msu.montana.edu/diabetes/default.htm.

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